Notes 11/3:

Scalar → just magnitude

Vector → magnitude and direction (denoted with a bar over the letter → $\bar{v}$)

Scalar		Vector
distance	add direction →	displacement
speed	add direction →	velocity
time		
		acceleration

Equations:

$$s = \frac{d}{t}$$ speed = $\frac{\text{distance}}{\text{time}}$

$$\bar{v} = \frac{\bar{d}}{t}$$ velocity = $\frac{\text{displacement}}{\text{time}}$

$$\bar{a} = \frac{\bar{v}_f - \bar{v}_i}{t}$$ acceleration = $\frac{\text{final velocity} - \text{initial velocity}}{\text{time}}$

Examples:

1. A car travels 600 m west with a velocity of 30 m/s west. How long did it take the car to travel this displacement?

$\bar{v} = \frac{\bar{d}}{t}$

$\bar{v} = 30$ m/s west

$\bar{d} = 600$ m west

$t = ?$

$t = \frac{\bar{d}}{\bar{v}}$

$= \frac{600 \text{ m west}}{30 \text{ m/s west}}$

$= 20$ s

2. A car starts at rest and accelerates at 10 m/s^2 for 15 s. What is the car's final velocity?

$a = \frac{v_f - v_i}{t}$ ($v_i \to 0$)

$a = 10$ m/s^2

$v_i = 0$ m/s

$v_f = ?$

$t = 15$ s

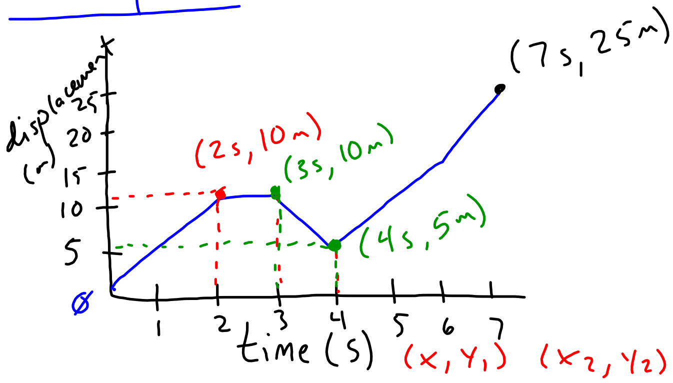
$a = \frac{v_f}{t}$

$v_f = at$

$= (10 \text{ m/s}^2)(15 \text{ s})$

$= 150$ m/s

Graphs:



(x₁, y₁) (x₂, y₂)

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{\text{displacement}}{\text{time}} = \frac{\bar{d}_2 - \bar{d}_i}{t_2 - t_1}$$

= Velocity!

Velocity from t = Øs to t = 2s

$$V = \frac{d_2 - d_1}{t_2 - t_1}$$

$$= \frac{10\,m - \varnothing\,m}{2\,s - \varnothing\,s}$$

$$= 5\ m/s$$

velocity from 3s to 4s:

$$V = \frac{d_2 - d_1}{t_2 - t_1}$$

1st point (3s, 10m)

2nd point (4s, 5m)

$$= \frac{5m - 10m}{4s - 3s}$$

$$= \frac{-5\,m}{1\,s}$$

$$= -5\ m/s$$

Vector Addition:

- Head to Tail
- Resultant is head of first to tail of last